WHAT IS CLAIMED IS:

1. A muscle fatigue level measuring device comprising: impedance component measuring means, muscular tissue effective length measuring means biologically equivalent model parameter computation means, and muscle fatigue level determination means, wherein the impedance component measuring means measures a resistance component and a reactance component in a body part as impedance in the body part, the muscular tissue effective length measuring means measures a muscular tissue effective length in the body part, the biologically equivalent model parameter computation means computes biologically equivalent model parameters including extracellular fluid resistivity and distribution membrane capacitance based on the resistance component and reactance component measured by the impedance component measuring means and the muscular tissue effective length measured by the muscular tissue effective length measuring means, and the muscle fatigue level determination means determines a muscle fatigue level based on the ratio between the extracellular fluid resistivity and distribution membrane capacitance computed by the biologically equivalent model parameter computation means.

2. The device of claim 1, wherein the impedance component measuring means comprises:

current supply means,
voltage measuring means, and
impedance component computation means,
wherein
the current supply means supplies alternating currents of multiple frequencies to a body part,
the voltage measuring means measures voltages generated in the body part by supplying the alternating currents of multiple frequencies by the current supply means, and
the impedance component computation means computes resistance components and reactance components in the body part by dividing the voltages measured by the voltage measuring means by the currents supplied from the current supply means.

3. The device of claim 2, wherein the alternating currents of multiple frequencies are an alternating current with a frequency of 50 kHz and an alternating current with a frequency of 6.25 kHz.

4. The device of claim 1, wherein the muscular tissue effective length measuring means comprises:
part length measuring means,
part width measuring means, and
muscular tissue effective length computation means,
wherein
the part length measuring means measures a part length in the body part,
the part width measuring means measures a part width in the body

part, and

the muscular tissue effective length computation means computes the muscular tissue effective length in the body part based on the part length measured by the part length measuring means and the part width measured by the part width measuring means.

5. The device of claim 2, wherein the muscular tissue effective length measuring means comprises:

part length measuring means,

part width measuring means, and

muscular tissue effective length computation means,

wherein

the part length measuring means measures a part length in the body part,

the part width measuring means measures a part width in the body part, and

the muscular tissue effective length computation means computes the muscular tissue effective length in the body part based on the part length measured by the part length measuring means and the part width measured by the part width measuring means.

6. The device of claim 3, wherein the muscular tissue effective length measuring means comprises:

part length measuring means,

part width measuring means, and

muscular tissue effective length computation means,

wherein

the part length measuring means measures a part length in the

body part,

the part width measuring means measures a part width in the body part, and

the muscular tissue effective length computation means computes the muscular tissue effective length in the body part based on the part length measured by the part length measuring means and the part width measured by the part width measuring means.

7. The device of claim 4, wherein the muscular tissue effective length computation means computes the muscular tissue effective length by use of the following expression:

$$Meff = k \sqrt{Ml^2 \times Mw^2}$$

wherein Meff represents the muscular tissue effective length, Ml represents the part length, Mw represents the part width, and k represents a correction coefficient.

8. The device of claim 5, wherein the muscular tissue effective length computation means computes the muscular tissue effective length by use of the following expression:

$$Meff = k \sqrt{Ml^2 \times Mw^2}$$

wherein Meff represents the muscular tissue effective length, Ml represents the part length, Mw represents the part width, and k represents a correction coefficient.

9. The device of claim 6, wherein the muscular tissue effective length computation means computes the muscular tissue effective length by use of the following expression:

$$Meff = k \sqrt{Ml^2 \times Mw^2}$$

wherein Meff represents the muscular tissue effective length, Ml represents the part length, Mw represents the part width, and k represents a correction coefficient.

10. The device of any one of claims 1 to 9, wherein the biologically equivalent model parameter computation means computes extracellular fluid resistivity, intracellular fluid resistivity and distribution membrane capacitance as biologically equivalent model parameters by use of the following expressions:

$$(R + jX)/Meff = \rho r + j\rho x$$

wherein R represents the resistance component, jX represents the reactance component, Meff represents the muscular tissue effective length, and ρr and jρx represent a real part and imaginary part of complex resistivity, respectively,

$$1/(\rho r + j\rho x) = 1/Re + 1/(Ri + j \times 2\pi \times f \times Cm)$$

wherein Re represents the extracellular fluid resistivity, Ri represents the intracellular fluid resistivity, Cm represents the distribution membrane capacitance, f represents a measuring frequency, j represents an imaginary number, and π represents a pi.

11. The device of any one of claims 1 to 9, wherein the muscle fatigue level determination means computes the muscle fatigue level by dividing the extracellular fluid resistivity by the distribution membrane capacitance.

12. The device of claim 10, wherein the muscle fatigue

level determination means computes the muscle fatigue level by dividing the extracellular fluid resistivity by the distribution membrane capacitance.

13. The device of claim 11, wherein the muscle fatigue level determination means further computes a more accurate muscle fatigue level by considering at least one of personal data including a body weight, a body height, age and sex in addition to the computed muscle fatigue level.

14. The device of claim 12, wherein the muscle fatigue level determination means further computes a more accurate muscle fatigue level by considering at least one of personal data including a body weight, a body height, age and sex in addition to the computed muscle fatigue level.

15. The device of claim 1, comprising:

a main body,

first ranging portions,

second ranging portions, and

electrode sets,

wherein

the main body serves as a base,

the first ranging portions are disposed on the main body such that they can slide freely in a part width direction in a body part so as to measure a part width,

the second ranging portions are disposed on the first ranging portions such that they can slide freely in a part length

direction in the body part so as to measure a part length, and the electrode sets comprise current-carrying electrodes and measuring electrodes which are disposed at positions on the second ranging portions which correspond to the part length, the impedance component measuring means includes the electrode sets and measures a resistance component and a reactance component in a body part which is in direct contact with the electrode sets as impedance in the body part, and

the muscular tissue effective length measuring means computes a muscular tissue effective length in the body part based on the part width measured by the first ranging portions and the part length measured by the second ranging portions.

16. The device of claim 15, wherein the electrode sets are disposed at the positions on the second ranging portions which correspond to the part length via flexible, elastic members.